Light and Lighting

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Contents

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The End of the Beginning

WITH this issue we complete the volume of LIGHT AND LIGHTING for 1953, and shall publish the journal no more in its present size. Improvements in the journal, which we began a year or two back, have been generally appreciated by our readers at home and abroad. But it was never our intention to stop at what, so far, we have been able to achieve, and now we have come to the end of the beginning in making LIGHT AND LIGHTING the kind of journal—in appearance and contents—we think it should be in view of the importance of the subjects it covers. With our next issue the size of our page will be doubled, and there will be larger print on better paper. Besides giving our advertisers more space to announce their products effectively, these changes will enable us to publish more material and to improve its readability. Our circulation—already widespread—we confidently hope will increase as the journal is bettered.

Notes and News

Light and Lighting

Twelve years ago this journal, in common with many others, adopted the present page size as an economy measure. The small size seemed strange at first, but in time we adjusted ourselves to it, and now many of us accept it without question.

This issue, however, is the last to be published in the present size; as from the next issue in January we will appear on a larger page, almost double the size of the present one. Some may regret the passing of the "pocket size" journal and we must admit that there is a lot in its favour. The larger page, however, will enable us to present material, both editorial and advertisements, in a more attractive form and, probably the most important consideration with our particular subject, allow better reproduction of illustrations.

Another point which has influenced the decision to change the page size is the prestige of the journal and of the British lighting industry overseas. After the war, when we were all conscious of the need to publicise British activities and products overseas and to increase our exports, we were severely handicapped by the need to continue war-time economy measures, as a result of which this journal, amongst others, compared unfavourably with the glossy publications from other countries. The change in page size and the use of a better paper is another step towards making *Light and Lighting* truly representative of the British lighting industry overseas as well as providing our readers with a better journal. These changes cannot be effected without an increase in costs, and the price of the journal will therefore be slightly increased; we know that readers will find the new journal well worth the increased cost.

We are now working on the new journal (journalists never seem to live in the present but always at least a month ahead), and we feel that the changes are so drastic, even though they may not seem so to readers, that it almost seems that the present journal to which we, and we hope the majority of our readers, have become attached is now being placed on the retired list and that we are about to see the last of a friend with whom we have been working for a long time. We are sorry to see our friend go—but we welcome his successor, who will start as a new boy, have much to learn, but who, no doubt, will bring fresh ideas to the job.

As this is such a major change we would like to thank all those contributors from this country and overseas who in the past have helped us so much with their articles on such a wide range of subjects. We are happy to know that we shall have their support in the future. And, if we may be permitted to add our own postscript, readers will be glad to know that our contributor "Lumeritas" will continue to produce his page, though we would mention, in strictest confidence, that at this moment he is a little worried at the prospect of having to write more than at present.

Street Lighting Columns

Our attention has been drawn to a mistake in the article which appeared in our November issue on timber lamp standards. In the article it is stated that all Class "A" street lighting column designs must be approved by a committee set up by the Council of Industrial Design before loan sanction is granted

to local authorities by the Ministry of Transport. This statement may be misleading to lighting authorities.

The actual facts are as follows. The Minister of Transport makes a 50 per cent. contribution to the cost of approved lighting schemes on trunk roads. These contributions are only available for Class "A" lighting, and the design of the 25-ft. columns used must have been passed either by one of the Royal Fine Arts Commissions or approved by the Council of Industrial Design.

With regard to Class "B" lighting and all lighting on roads other than trunk roads, authorities are encouraged to adopt good designs of columns, but this is not in any sense a condition of loan sanction.

Colour Rendering of Fluorescent Lamps

At its next meeting the Colour Group of the Physical Society is to discuss a subject of great interest to every illuminating engineer. There are to be three papers. The first, by Miss B. M. Young and Mr. G. T. Winch, is entitled "Binocular Viewing Investigations," and will describe the work done at Wembley in an attempt to correlate the subjective colour rendering of different lights with the objective measurements. The second paper, by Dr. S. T. Henderson and Mr. D. T. Waigh will give a "Critical Review of Colour Rendering Problems" and the authors will deal with the difficulties which arise when an attempt is made to express colour rendering properties quantitatively and to lay down tolerances in terms of measurable characteristics. The problem can be simplified by grouping lamps into a few classes according to the kind of use to which they are put. In the third paper Dr. B. H. Crawford, of the National Physical Laboratory, will describe "A Logical Method of Investigating Colour Rendering," using an instrument in which it is possible to illuminate objects with light from which a gradually increasing fraction of one of the eight spectral bands is removed. The fraction at which a change in the appearance of the object is first noticed defines a tolerance threshold in that particular spectral band.

The meeting will be held at the Institution of Electrical Engineers on Wednesday, December 9, at 2.30 p.m. It is understood that tea will be available. Members of the Illuminating Engineering Society are invited to be present and to take part in the discussion of the papers.

The last meeting of the Group had a very physiological flavour. It was held at the Institute of Ophthalmology on November 4, and Dr. W. A. H. Rushton, of Trinity College, Cambridge, gave a paper on "Chemical and Nervous Factors in Scotopic Dark Adaptation," in which he maintained that the visual purple had nothing to do with the increase of sensitivity of the eye under conditions of low illumination. He favoured the theory that it was due to an increase in both the time and the area over which summation of individual impulses took place. The second paper was by Dr. R. A. Weale, who described some interesting properties of the cat's eye. In particular, he described how the density of visual purple could be deduced from *in situ* determinations of the spectral reflectivity of the tapetum (the membrane responsible for the glow of a (real) cat's eye at night when strongly illuminated).

At the meeting of the Group held on September 16, Mr. R. M. Evans, secretary of the Inter-Society Colour Council of the United States, and author of a recent popular book on colour, gave a paper entitled "Some Aspects of White, Grey and Black" in which he considered how these three terms and the related term "clear" might be placed on a psycho-physical basis. He said that grey was an independent variable, not necessarily related to either white or clear, but having black as a special case. His paper concluded with a discussion of the terms in relation to the modes of appearance.

Court 5, Central Criminal Court, Old Bailey.

Looking Lighting in the Face

A light-hearted approach to a serious subject.

By W. ROBINSON
B.Sc., A.M.I.E.E., F.I.E.S.*

I think many of us must be asking ourselves whether present-day lighting practice is really matching up to its potentialities. Are we making the best use of lighting equipment, and of fluorescent lamps? How much of the research on glare and brightness is finding application? Is the public any more light conscious now than before the war? And what is wrong with present-day lighting fittings?

Heresy and the S.D.R.

The last question is perhaps unfair to many who have tried, and are trying, very hard to produce fittings which are fit for their purpose. But what is the true purpose of a lighting fitting? Is it to control the direction and intensity of luminous flux, is it to conceal the lamp or lamps, is it to be ornamental, as a luminous feature, or is it to fulfil all these requirements? Fairly obviously the purpose of a lighting fitting changes with its type, but there must be a basic approach to them all, and I suggest that the common denominator of the fittings equation is simply that it must interfere as little as possible (consistent with its function) with the free flow of light. Light control, as it is classically conceived, seems on the other hand to be based on the maximum degree of interference with the escape of light.

Take, for example, that old favourite the Standard Dispersive Reflector. It is designed to redirect all upward lamp light downwards. Partly as a result of this requirement 30 per cent. of the available light is lost. It is now recognised (even in the U.S.A.) that there should be plenty of light upwards as well as downwards in factories. Then why do we deliberately soak up 30 per cent. of the lamp light in preventing this? Why go to the expense of providing (and keeping clean) enamelled reflecting surfaces? One answer is, of course, that merely to release the light upwards as well as downwards is no answer to the problem of producing x foot-candles on the work economically. Another good answer is that the reflector is designed to give uniform illumination at a reasonably economic fittings spacing. Neither answer is entirely satisfactory unless it can be shown that alternative methods give inferior results. Has the experiment been tried of using a simple shielding ring with the same angle of cut-off, releasing *all* the upward light and most of the downward light? Would the reduction of fittings loss to, say, 15 per cent. compensate adequately for reduction in downward light? It probably would not, but the saving in fittings cost and the almost certain improvement in lighting conditions due to a bright ceiling are compensatory features.

The point is debatable, but it is surely not sufficient just to write off the notion as heresy. The present fittings situation invites heretics to challenge it.

The Strangulation of the Fluorescent Lamp

No one can view the average commercial fluorescent lighting installation with any great satisfaction except those who admire the colossal and the expensive for their own sakes. In this year of grace it should not be necessary, in order to dissipate 100 watts, to encase a superbly functional fluorescent tube in an archaic and massive control chamber almost big enough to sleep in and half the cost of an electric cooker (and nearly

*Mr. Robinson is the Lighting Officer of the British Electrical Development Association, but, in order to avoid possible pain to his organisation, wishes it to be made clear that no blame attaches thereto for the purely personal views expressed herein.

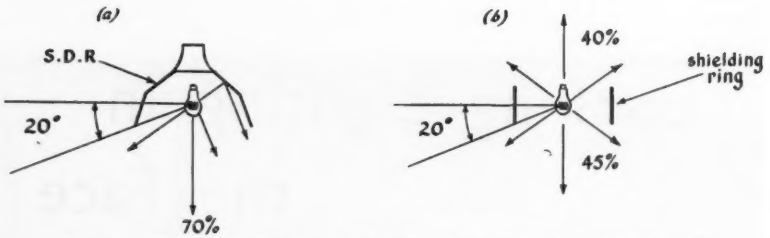


Fig. 1. Where the light goes: (a) Standard dispersive reflector, (b) Shielding ring.

as heavy !). It should not be necessary to introduce into a reasonably clear interior a nightmare pattern of pseudo-streamlined monsters, the more expensive of which snarl down what remains of their light through clenched louvre teeth, or present to anxious view their livid white underbellies like a school of sharks seen from below.

It seems to be not only unnecessary but expensively unnecessary. Whatever may be said for careful lighting control in the case of filament lamps (and there is much that can be said for it when light is dearly bought) there is little justification for equally close control of fluorescent lamp light in view of :—

(a) the cheapness of the light (in terms of electricity cost);

(b) the higher illumination normally achieved with a fluorescent lighting installation, and the correspondingly decreased sensitivity to a slight reduction.

The emphasis has moved over from lighting efficiency to its overall effectiveness. The light is diffused at birth, so why diffuse it further ? Upward lighting is needed, so why stop it ? Precise light control is unnecessary and uneconomic, so why attempt it ? If these factors are accepted, we can define the purpose of a fluorescent fitting as follows :—

(a) to support the lamp gracefully and economically;

(b) to conceal the lamp from view within a minimum angular range determined by the circumstances of use;

(c) to control broadly the proportion of total light flux in the upper, lower and sideways directions.

(d) Subject to the above—to release into the room the maximum proportion of lamp light.

The average fluorescent fitting fails on both points of (a) for a number of reasons :—

(i) Its bottom aperture is too wide, making the fitting expensive and bulky. This follows naturally from the closed or nearly closed top which would cause a narrow fitting to be a light trap.

(ii) It releases insufficient light upwards.

(iii) Its dimensions, design and cost are largely determined by the design exigencies inherent in the inclusion of control gear within the fitting.

Contemporary fittings succeed in (b) either too well or not at all; often the degree of concealment is fortuitous.

As regards requirements (c) and (d) the less said the better in many cases.

Open the Throttle

We can simplify the examination of the distribution of a fluorescent fitting by assuming that light control is effected mainly along the lamp axis and ignoring end effects in considering the proportion of light emitted in various directions. This assumption will not satisfy the purists, but who are they to complain?—they have produced no suggestion for calculating the zonal flux of a fluorescent fitting beyond polar curves and Iso-lux diagrams, neither of which serves the purpose envisaged here.

Let us consider a few simplified fittings sections on this basis :—

The efficiency of the average trough

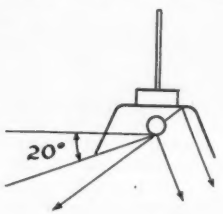


Fig. 2. Fluorescent trough fitting.

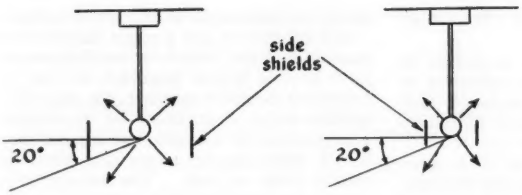


Fig. 3. Cross section of hypothetical fluorescent fitting.

reflector, i.e., the proportion of light leaving the fitting, is known to be of the order of 70 per cent. The angle of escape, with a 20 deg. cut-off angle, is 140 deg., i.e., freely emitted light represents 140/360=nearly 40 per cent. of the whole. Of the remaining 60 per cent. half eventually emerges from the fitting (when clean!). If the reflector were to be increased to infinite size this 50 per cent. would become the reflection factor of the reflecting surface—say 70 per cent. for white. Obviously it is a costly job increasing fittings efficiency this way.

Now consider two hypothetical cross sections of fittings without the restrictive influence of an equipment channel or box.

3 (a) releases some 80 per cent. of lamp flux freely and approximately 50 per cent. of the flux to the reflector shields will escape, i.e., 10 per cent., making a total output of 90 per cent., say, 45 per cent. up and 45 per cent. down.

From Utilisation Factor tables, taking two extremes of Room Index, A and J, we can derive the overall Coefficient of Utilisation of a normal fluorescent trough reflector (2) and fitting 3 (a), considering the latter as the combination of a trough reflector of 45 per cent. efficiency and an indirect reflector of 45 per cent. efficiency.

As is to be expected fitting 3 (a) compares favourably with the trough fitting were ceilings are light and rooms are large relative to their height, and unfavourably where the converse is true.

In general it seems that, for the average modern multi-storeyed workroom, fitting 3 (a), and similarly 3 (b), will require 5-10 per cent. higher wattage than a trough reflector for the same illumination. In return we can expect:—

(i) Higher brightness of surroundings than from 2.

(ii) Less glare than any fitting in category 2 due to above.

(iii) Considerable reduction in reflector cost, particularly in the case of 3 (b) since the area of the shields decreases in ratio to the aperture.

(iv) Drastic reduction in weight and bulk leading to easier and more flexible installation.

(v) Very great improvement in appearance of installations (at least to those who

		Reflection Factors (per cent.)				
	Ceiling	70		50		30
	Walls	50	10	50	10	10
Fitting Type	Room Index	Coefficient of Utilisation				
2	A	.33	.24	.32	.24	.24
3 (a)	A	.3	.21	.27	.16	.14
2	J	.64	.60	.63	.59	.59
3 (a)	J	.65	.59	.56	.51	.46
Channel	A	.3	.21	.27	*	*
Channel	J	.70	.60	.60	*	*

* Not recommended on other grounds.

are interested in lighting effect more than lighting mechanics).

(vi) Great flexibility inherent in design of category 3 fittings. The addition of transverse louvres, for instance, will have less effect in reducing utilisation than in category 2 fittings.

(vii) The brightness distribution in a room lighted with category 3 fittings will conform more closely to recommended practice, avoiding the excessive brightness contrasts of both direct and indirect lighting and the discomfort and disability glare due to the use of channel fittings.

Fittings and the Man in the Street

Life has become much more interesting since our fittings designers have gone all Scandinavian and skittish. The Festival of Britain lives on in a vast and increasing selection of contemporary domestic lighting fittings which utilise to the full, and overflowing, the rather limited scope offered by pleated buckram (or parchment), pierced metal, slender tubing and, in gloriously baroque effulgence, Chrysaline. The Praying Mantis and the Centipede head the list of inspirations for a selection of portable lamps which lurk in a perpetual state of nightmarish readiness to spring on the unwary. Flexible cable, once coyly tucked away within the fitting, now loops itself shamelessly around and about the fitting.

Although we may be flippant on the subject, nevertheless, these new fittings are cheap and worthy of respect for their freshness of approach. As regards their lighting qualities, however, the situation remains unhappy. Most modern fittings trap more light than they release; too many are mere luminous features, attractive but slightly futile. Table and floor standard lamps are particular offenders. They have a definite job to do but they are not made to do it. There is a sensible British Standard (B.S. 710/1948) which lays down basic design requirements but which does not inhibit design or appearance in any serious direction —and yet there is not a single standard lamp marketed to-day which is certified to conform to this British Standard, in fact it is extremely doubtful whether the majority of manufacturers even know of its existence. The purchase of domestic lighting equipment is, for most people, a guessing game with mostly losers to back. The average person setting out to buy, for example, a floor standard must expect to be confronted with a wide assortment of expensively or meretriciously tricked out poles surmounted by shades (expressive name!) of every possible shape, size, texture and colour, the whole effect being topped off by the inclusion of a lamp which serves mainly to reveal the decoration of the shade and to elevate this piece of gimcrack to the status of electrical equipment.

Who can blame the public which buys, the manufacturer who makes, or the retailer who sells unsuitable lighting equipment when there is so little done to set up lighting performance criteria, or even to explain that the function of a lighting fitting is just as much to provide suitable lighting as that of a washing machine is to wash clothes? If a washing machine does not wash clothes properly it won't sell but most lighting fittings which are sold to-day absorb more light than they provide. The attempt to popularise the "Study Lamp" failed in the past perhaps because there were not sufficient resources behind it, and perhaps because it was not persistent enough. What about trying again with "British Standard Lamps" bearing the B.S. mark as a certificate of lighting performance? Surely the manufacturers could join forces with Area Electricity Boards and others to establish such a lighting Hall Mark. It is at least worth the attempt.

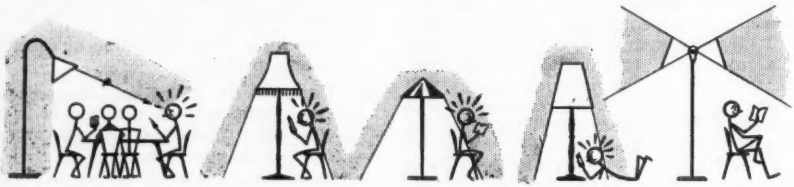


Fig. 4. Story without words.

Lux Before Luxury

The final set of grumbles concerns lighting practice generally. There is too wide a gap between the luxury job and the dreary

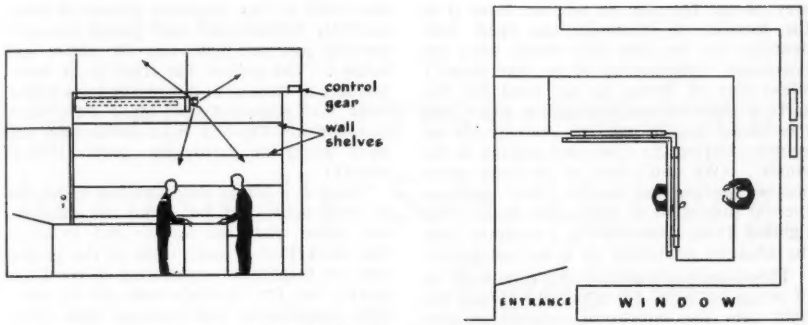


Fig. 5. Lighting the small shop.

commonplace; too little enterprise shown in getting results where funds are limited. The mind reels before illustrations of interiors which are apparently resting places for surplus lighting fittings and interiors in which every conceivable architectural device has been applied to make the lighting expensive and the effect macabre. Lamps are snugly tucked away behind portholes, passing their brief existence in the midst of a maelstrom of expensive inter-reflections. Lamps are secreted in cornices, hemmed in by louvres and diffusing sheets, encased in tubes, diabolos, cones, etc., neatly perforated to relieve the pressure of light trapped inside, while internally silvered spot-lighting lamps, in stream-lined shrouds, lurk tipsily in corners ready to step into the breach.

Of course, it's all very well to indulge in facile criticism, but the real point is that imagination and creativeness seem to be allied always with expense. The small lighting installation is so often a routine fittings-hanging job giving joy to no one. This is a pity, for the great mass of people derive the flavour of life from small places, their own home, the local shops, their office. These places can be lighted well by conventional methods, but seldom cheaply; is it not possible to light them really well and at a reasonable first cost? Consider, for example, a normal small retail shop. Below is a plan and elevation of such a shop, say a tobacco and confectioner's, which is typical of thousands up and down the country. Let's divorce ourselves from the past and create a fluorescent lighting scheme for this shop on the principle, already suggested, that ancillary equipment, and hence cost, shall be kept to a minimum. The light distribution required seems obvious enough. On two sides there are wall shelves, these need vertical plane lighting; the L-shaped counter needs down lighting; the ceiling can stand some overflow light; the floor is always the least attractive part of a shop and, any-

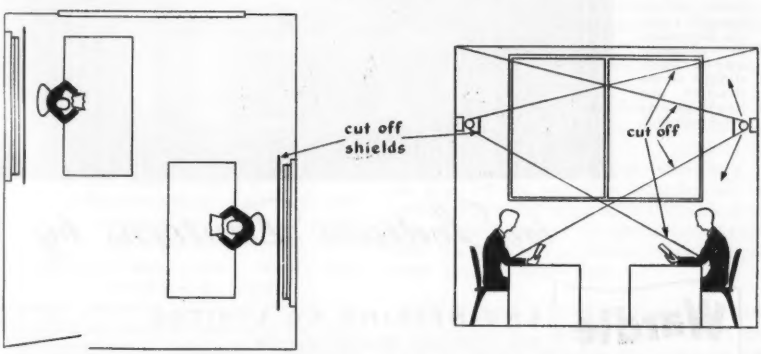


Fig. 6. Lighting the office cubicle.

way, is not for sale, so we can leave it to the mercies of interreflections (and, incidentally, do we care very much what the horizontal illumination is in this shop?). What sort of fitting do we need for this sort of distribution, bearing in mind that the lamps should not be seen at all by people entering the shop and looking at the goods? (We don't have to be fussy about people *looking* for lamps, they can see them if they want to crane their necks.) The lighting fitting shown in Fig. 5 seems to meet the situation admirably (it is not patented!).

This ingeniously contrived fitting might be of wood or metal. It admirably directs the light into the directions required; it provides concealed lighting (a luxury this) for the customer, the assistant isn't worried since the lamps are well above his line of sight; it is not inelegant when properly finished, it is easily erected and cheap. Could we ask more in any fitting? This fitting is obtainable from your local carpenter, to your specification. (No discounts offered!)

Or, again, consider an office cubicle of the type so common nowadays (Fig. 6).

What is wrong with just putting a channel fitting on the wall behind and above each desk with a very exiguous pelmet in front, carefully dimensioned and placed so as to provide just adequate cut off above and below? The author has tried it—it works wonders in those soul-destroying steel cubby-holes that represent this brave new world (thoughtfully finished in a permanent sea-weed green or battleship grey, 1914-18 variety).

There is a lot of innocent fun to be had in other fields, too, but these two examples will show what the author has in mind. The work that is being done at the present time on brightness engineering is good and useful, but for heaven's sake let us put a little imagination and courage into every-day lighting and not just sit on our heels waiting for the final, all-embracing formula to emerge ready made for us. We shall still be waiting for that when Gabriel's trumpet sounds.

Acknowledgment

The photograph of Burford High Street which appeared in the article on Lamp Posts and Landscape in our November issue was reproduced by kind permission of British Insulated Callender's Cables, Ltd. The lamp standards were superimposed by us.

Flameproof, Pressurised and Intrinsically Safe Lighting Equipment

A review of current industrial practice

By HUGH S. ALLPRESS
A.M.I.E.E. F.I.E.S.*

Engineers who have not followed the considerable developments in flameproof equipment, and the alternatives which are sometimes preferable, will find it easier to understand current practice to meet with the present-day statutory requirements under the Factories Acts,[1] if, in the first place, the various hazards are regarded as being sub-divided into two main classes. This may be seen from the following examples of normal power or lighting installations (excluding references to "intrinsically safe" gear which is mentioned later):—

Class 1: *Installations where electrical equipment is permissible only if of flameproof or approved pressurised design*:

Group (I) Mines, sewage disposal plant (fire-damp, or methane).

Group (II) Garages, petrol plants (petroleum and other vapours).
Blast furnace gas handling plant (carbon monoxide).
Paint spraying and storage (acetone vapour).
Pharmaceutical and chemical engineering (e.g. amyl-acetate).

Group (III) Coal-gas, coke oven and Bluewater gas plant.

Industrial processes involving liability to produce fine dust clouds, such as in the milling of cocoa, flour, chemicals, aluminium powder, etc., may also constitute an explosive hazard and special precautions are necessary. The use of flameproof apparatus may be the most practicable solution in some instances.

Class 2: *Installations where all electrical equipment is prohibited unless of approved pressurised design*:

Group (IV) Where the "excluded" gases are present, such as acetylene, hydrogen or carbon disulphide.

Lighting in Group IV Areas

It has only recently been permissible to install and operate any serious electrical plant, including lighting, in this class of installation following the development of practical "pressurised" apparatus, which is acceptable to the Factories Inspectorate—apart from the restricted use of "intrisically safe" apparatus. The latter is not, however, suitable for normal purposes such as general lighting as is explained later.

To appreciate fully the importance of the foregoing and the increased facilities now open to the works engineer, in spite of the increasing tendency towards stringency on the part of the factories inspector as improved and safer equipment becomes available, it is necessary to understand exactly what is meant by the various types of equipment already mentioned.

"Flameproof" Equipment—a Definition

"Flameproof" lighting and ancillary gear such as conduit, switches, etc., may be quite simply defined as material which is certified

* Registered Lighting Engineer (I.E.S.).

to be such by the Ministry of Fuel and Power, which publishes lists of all such certifications from time to time.

Only certified "Flameproof" or "F.L.P." apparatus, as it is frequently termed, carries the registered mark of the British Standards Institution (see Fig. 1), together with the maker's name, certificate number and group number of the gas as defined in BS. 229(2).

In practice, therefore, there is no difficulty in immediately recognising true "Flameproof" lighting or other electrical equipment and the group of gases in which it may be safely employed.

Such terms as "gas-tight," "explosion-proof," "vapour-proof," etc., are, therefore, really obsolete, and their continued use is strongly to be deprecated as being misleading. These names are, in fact, relics of the past when attempts to make fittings "safe" were solely concerned with endeavours to prevent the ingress of inflammable gas into the fitting by use of gaskets and such devices as the use of double well glasses, etc.

In general, certified flameproof equipment is now based upon the application of entirely different principles which do not depend upon any attempt to prevent the passage of gases between the inside and the outside of the enclosures. Instead, each lighting fitting and every other part of the installation must be capable of withstanding, without fracture, the pressure of any explosion which may occur inside the apparatus. Such an explosion might be due to an electrical fault or caused by normal sparking at switch contacts within the flameproof enclosure.

Any leakage of hot gases due to the pressure developed by such an internal gas explosion can then only be released through labyrinth passages, spigot joints or between machined flanges of such lengths or widths that, in the process, they are cooled to such an extent that they cannot ignite any inflammable mixture of gas in the surrounding atmosphere.

British Standard Specifications and Code of Practice

Generally speaking, all flameproof electrical apparatus, before it can be forwarded to the testing station of the M.O.F.P. for certification(3), must comply with the requirements of British Standard 229 and other specifications covering particular items of equipment as mentioned at the conclusion of this article.

British Standard 889 (1947) (4) covers electric lighting fittings and reference should also be made to the British Standard Code of Practice No. CP. 1003/1948 (Flameproof and Intrinsically Safe Electrical Equipment) for further details(5).

It will be noted that the use of gaskets is entirely prohibited in any form of flameproof equipment, and all joints must be made by machined metal-to-metal contact, manufactured to a rigidly enforced tolerance.

The maximum gap clearance between flanges is 0.020 in., 0.016 in., and 0.008 in. respectively for Groups I, II and III. In practice, the manufacture of the equipment to the latter finer tolerance usually involves a ground finish and, in the interests of production efficiency, the principal manufacturers are now tending towards producing all flame-proof equipment with the Group III tolerances, so that it may be certified and used in more than one group where the design is otherwise acceptable.

Water- and Dust-proofing Joints

In view of the fact that all joints in flameproof lighting equipment must be metal to metal, it follows that they may not, for instance, remain completely watertight under the pressure difference, consequent upon the heating and cooling cycle in use. In certain fittings special precautions are taken in the design to minimise this effect, but some confusion on this point does undoubtedly occur. It should be understood that there is nothing in the Regulations or the Code of Practice to prevent painting over the joints *after they have been made and the equipment finally installed ready for operation.* Any such painting should be thoroughly removed before again breaking the joint to prevent any chippings getting into the fittings or on to the flanges. It is, of course, entirely wrong to paint the flanges, which should only be greased before assembly.

Developments in Flameproof Lighting Fittings for Tungsten Filament Lamps

Developments during the past few years have been chiefly directed towards reducing the weight by the use of approved corrosion-resisting light alloys and the reduction in overall height.

Recently certified lighting fittings complying with the requirements of BS. 889 as amended to date are generally of larger diameter than hitherto to keep down the surface temperature to newly prescribed limits, primarily with the object of complying with the cellulose solution regulations. Modern F.L.P. lighting fittings for the most strenuous industrial service incorporate

Fig. 1. Flameproof registration mark.

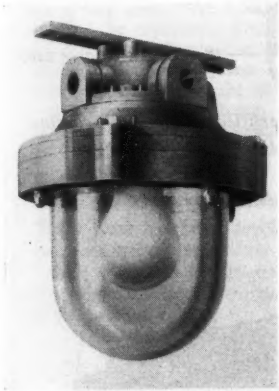


Fig. 2. Modern 100-watt industrial flameproof well-glass fitting.

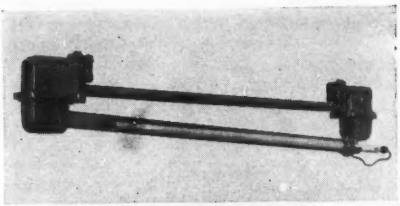


Fig. 3. 5-ft. flameproof fluorescent fitting certified for groups I and II. To remove lamp, locating screw is slackened, the glass tube then twisted and lowered to the extent of chain as shown.

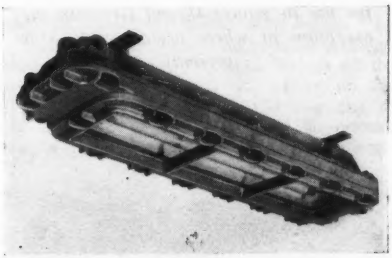


Fig. 4. Flameproof fittings for two 2-ft. 20-watt fluorescent lamps. Certified for groups I and II.

toughened glass globes as it has been found that this is the only material which will pass the thermal shock and impact tests for Type A units in BS. 889. These tests preclude the use of prismatic or annealed glass, which can only be utilised where conditions of use are less arduous and fittings known as Type B are permitted. "Perspex" may not be employed as an inherent part of the flameproof inclosure for either type.

At the same time such modern fittings include improved side-entry connections and are actually of less overall height—which is a very important matter—and reduced weight as compared with earlier units.

Flameproof Fluorescent Lighting Fittings

Developments in fluorescent lighting have been primarily concerned with facilitating erection and maintenance. Flameproof equipment is frequently installed in industrial plants in positions which are far from being readily accessible, and when mounted in continuous lines adjacent to walls or piping relamping must be possible without it being necessary to withdraw the lamp endwise.

An example of a new 5-ft. 80-watt fluorescent lamp fitting is shown in Fig. 3, in which the lamp may be replaced by one man operating from immediately below the fitting. This certified "FLP" fitting incorporates a glass protecting cylinder for the lamp. The fitting may be equipped with reflectors made up in two parts so that it can be formed into a complete trough for downward lighting, or, with one half only fitted, it may be used as an angle reflector as frequently required in the chemical industry in particular.

Fluorescent fittings, incorporating two 2-ft. lamps, Fig. 4, are also now available.

Fig. 5. Flameproof floodlight certified for use in groups II and III (with the exception of where acetone vapour is present).

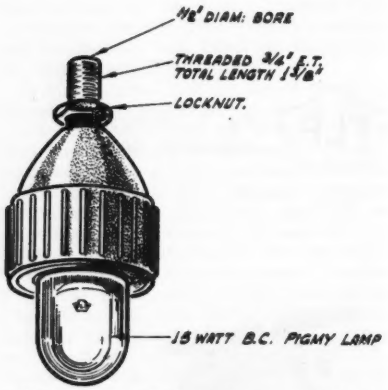


Fig. 7. Certified miniature well-glass lantern for use in petrol pumps.

Fig. 6. Safety battery torch. Certified for use where there may be risk from petroleum vapour, town gas or hydrogen.

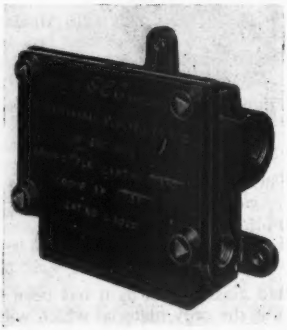


Fig. 8. Certified flameproof barrier box.

These new units have been specifically designed for industrial use where particularly robust fittings with a large light output, as compared with filament lighting fittings of equivalent wattage (40 watt), are required.

Flameproof floodlights with wattage ratings between 500 and 1,000 are now also certified for use in outdoor plants, which are a feature of modern chemical and oil-refinery installations; an example is shown in Fig. 5.

Mains-fed handlamps, which are tested and approved by the M.O.F.P. for use in Group II installations, are perhaps already well known, but an interesting development is battery-fed torches (see Fig. 6), which are certified for Groups I to III. They are almost invaluable in the event of breakdowns in industrial flameproof installations, apart from such applications as inspection in the garage and the gas industries.

It is not always appreciated that local authorities have an overriding interest in works and garages where petrol is stored or sold, and that a condition for the issue of the necessary licence to carry on such work or sales sometimes involves the installation of certified flameproof equipment over certain specified areas(6).

To meet with these requirements in the case of the usual service petrol pump, it

has been necessary to produce an entirely new range of miniature lighting fittings and conduit accessories such as that shown in Fig 7.

All the actual conduit and fittings within the casing of the pump—as distinct from the advertising globe on the top—must be flameproof. This is a Home Office requirement(6).

It is not infrequently overlooked that every flameproof installation must end somewhere. With few exceptions the electric supply enters the hazardous atmosphere from a safe area. At this point a barrier box must be inserted. Otherwise there is a danger that inflammable gases may leak through the conduit system and be ignited where they emerge in the safe area where no restrictions are in force. A flame may then travel through the conduit and cause a major explosion in the "danger" area.

Pressurised System

This system has been developed for protecting electrical apparatus and lighting fittings operating in hazardous areas in such a way that it is not only possible to dispense with flameproof fittings but even to extend the installation of electrical equipment to (Group IV) areas where previously all electrical apparatus was prohibited.

The new system covers a wide range of components, such as instruments, switches and portable hand-lamps, all of which are hermetically sealed and pressurised by air or carbon dioxide to approximately 5 lb. per sq. in. A series of pressure responsive switches are incorporated in various parts of the conduit installation, preferably adjacent to each piece of apparatus.

The contacts of the pressure responsive switches are all connected in series with each other and a special small circuit breaker. The contacts are maintained by the internal pressure, and the main breaker cannot be closed until the internal pressure is raised to the predetermined level. As long as this condition obtains it is, of course, impossible for the explosive atmosphere to find ingress into any part of the system, which therefore remains safe, since its external surface temperatures are well within safe limits.

Should there be any mechanical damage, such as breakage of a glass, failure of the neoprene hose covering the cables on the flexible hand-lamps, or should any one of the lighting fittings or switches be opened mischievously, or for maintenance purposes,

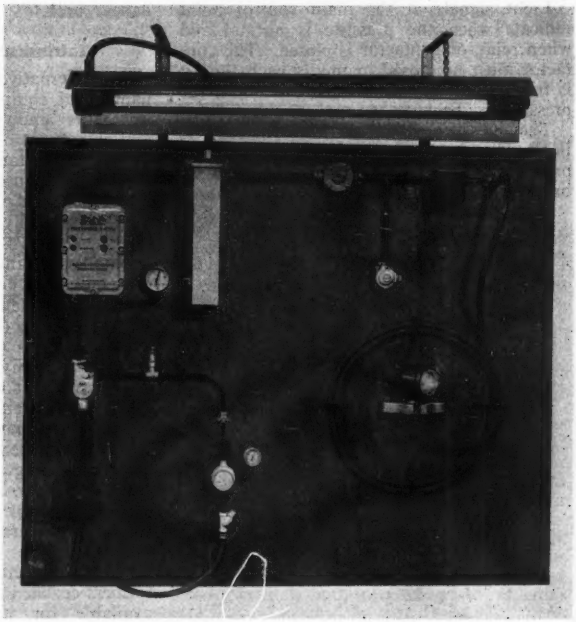


Fig. 9. Exterior view of demonstration layout of pressurised fixed and portable lights with control gear and switches.

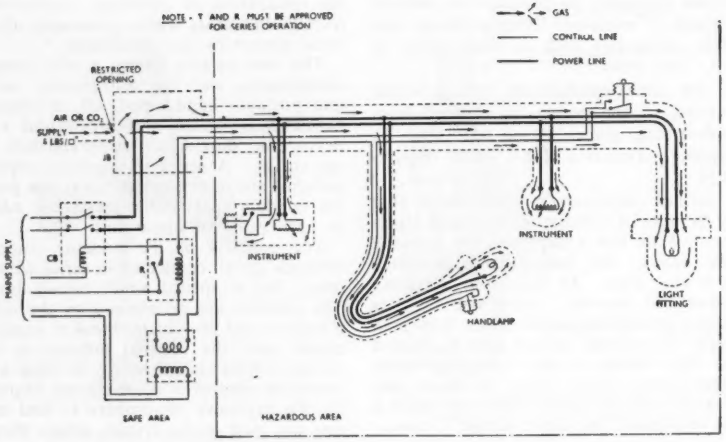


Fig. 10. *Diagram illustrating the principle of the pressurised system. T. Approved transformer. C.B. Circuit breaker. R. Approved relay. J.B. Junction box wire.*

then, long before the pressure falls to a danger level, the pressure responsive switch nearest to the seat of the trouble opens and trips the whole supply.

Light signals at the main control point indicate when the pressure is normal and when relay or contactor is closed. The contactor must be closed manually each time it is tripped, and this cannot be done until the pressure is back to normal.

The pressure responses switch circuit is in itself intrinsically safe (see later), and provisions can be made for the main circuit breaker to be installed in the Group IV area if necessary. The details of these arrangements will depend upon whether this space is surrounded by a Group II or III area or not. Normally the breaker is outside the danger area.

Fig. 11. *Transformer for low-voltage inspection handlamps of intrinsically safe type. This is installed outside the danger area.*

Intrinsically Safe Equipment

An alternative to the use of certified flameproof equipment for some purposes is apparatus known as "intrinsically safe," and equipment of this type can also be used in certain instances with the Group IV gases. It is used primarily for signalling and other light duties.

Fundamentally, the term "intrinsically safe" cannot be applied to isolated apparatus, but involves the whole system and essentially the electrical circuit.

More complete details will be found in BS. 1259/1945, (7) but, broadly speaking, apparatus and circuits coming under this heading can only be very lightly loaded and must contain some provision to limit the maximum current and so prevent the possibility of the sparking at switch contacts, or elsewhere, in the event of a fault, ever having sufficient energy to ignite a surrounding atmosphere containing a dangerous mixture of inflammable gases. Such circuits frequently operate from batteries of the Leclanche type or other primary cells of special construction, although special transformers certified as intrinsically safe are now available for use with hand-lamps, etc.

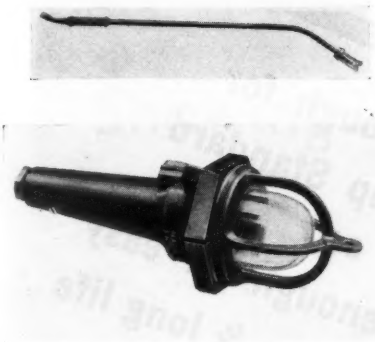


Fig. 12. *Two examples of approved safety handlamps for use with intrinsically safe source of power.*

(See Figs. 11 and 12.). It should be appreciated that intrinsically safe apparatus is limited to small loadings of this type, that is, to small inspection hand-lamps, signalling apparatus, and the like, and therefore is in no way an alternative to regular flameproof or pressurised equipment for normal services.

At present, intrinsically safe apparatus may only be used in the following restricted list of gases, and it is important to appreciate that, unlike flameproof equipment, it does not follow that if a piece of intrinsically safe apparatus is certified for a particular gas it is safe to use with others in the same group. The responsibility for these certifications rests with H.M. Chief Inspector of Factories. Intrinsically safe apparatus has been approved for the following list: Methane, Pentane, Hexane, Heptane, Hydrogen, Benzine, Cyclohexane, Coal Gas, Aceytone, Cokeoven Gas, Carbon Monoxide, Bluewater Gas.

Statutory Obligations

It is as well to mention in any article on this subject that for premises coming within the Factories Act, the mandatory requirements with which the works' engineer and the owners of the building have to comply, are primarily not those contained in the I.E.E. rules, but those known as the Electricity Regulations (which form section 28 of the 1947/8 Factories Act) (1) and particularly regulation 27. This requirement is further qualified for certain special industries, and the present position is admirably explained in a recently issued memorandum (8) published by H.M. Stationery Office, for the Chief Inspector of Factories.

Ventilation

In conclusion, it should be noted that the mere provision of apparatus in a continuously dangerous concentration of gas is not within the spirit of the Regulations if it is practicable to remove or reduce the hazard. Also, in general, there is a toxic risk when concentrations of inflammable gas or vapour are sufficiently high for there to be a risk of explosion. Consequently, consideration at all times should be given to the question of adequate ventilation. Sometimes it may be possible to interlock the ventilation plant with other equipment or to pipe high pressure fresh air direct to the vicinity of lamps used for lighting or drying and so reduce the continuous operational hazards.

The local H.M. Inspector of Factories will always be found most helpful in advising on such points within the scope of the Regulations to ensure the safety of plant and personnel with due regard to practicability and the availability of suitable apparatus.

Bibliography

(1) The Electricity (Factories Acts 1937 and 1948) Special Regulations 1908 and 1944. (H.M.S.O.)

(2) British Standard 229 : 1946. Flameproof Enclosure of Electrical Apparatus.

(3) Testing Memorandum No. 48. Test and certification of the Flameproof Enclosure of Electrical Apparatus. (Ministry of Fuel and Power.)

(4) British Standard 889 : 1947. Flameproof Electric Lighting Fittings (Bulkhead and Well-glass types).

(5) British Standard Code of Practice CP 1003 : 1948. Flameproof and Intrinsically Safe Electrical Equipment.

(6) Home Office Circulars 198/1947; 104/1948. Petrol Service Pumps and Associated Electrical Equipment (Explosives Dept., Home Office).

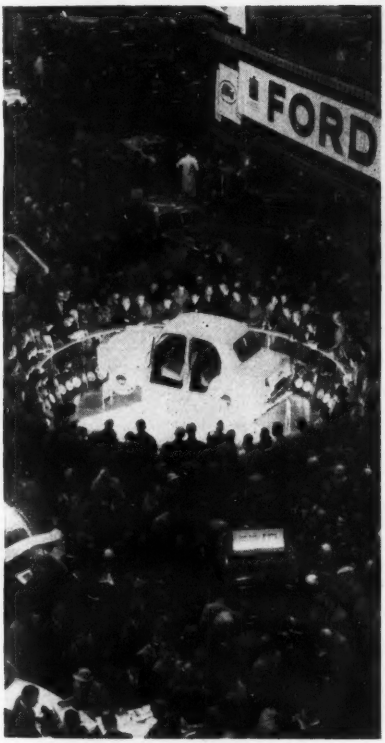
(7) British Standard 1259 : 1945. Intrinsically Safe Electrical Apparatus and Circuits.

(8) Memorandum by the senior Electrical Inspector of Factories on the Electricity Regulations. Fourth Edition 1951. (H.M.S.O.)

Electrician's Pocket Book

The 1954 edition of the Practical Electrician's Pocket Book (Odhams Press Ltd., price 5/-), has just been issued. As usual it contains a mass of useful information in a condensed but handy form and includes a section on lamps and lighting. A new section, prepared by Mr. H. J. Gibson, chief commercial officer of the Midlands Electricity Board, on how electricity can increase productivity, is both interesting and informative.

Showing Motor Cars



The Ford stand at the Motor Show.

Anyone thinking of buying a car can go to any of the innumerable showrooms at any time of the year and study the various models at leisure. Manufacturers, however, usually announce their new models and display them at the Motor Show which takes place in London every October. There the new cars are exhibited, in theory, for the world to examine; in theory at least as far as this year's show was concerned as there were so many people that it was almost impossible to get near to the popular models and certainly impossible to examine them in detail.

Few people, even lighting engineers, are likely to give much attention to lighting at the show though during recent years a number of ingenious devices and systems have been used by exhibitors to show their products to the best advantage. This year there were a number of variations on the illuminated platform technique, and one of the new Ford models was well displayed by being raised above the heads of the crowd on a revolving stand over a large internally illuminated star and surrounded by coloured floodlights, which all helped to make the exhibit conspicuous. This technique of putting the car on a pedestal certainly helps more people to get an idea of what the car looks like; sectionalised cars, such as that on the Austin stand, with carefully placed lamps to show up the various parts, also attract a lot of attention.

The show was full of sleek and beautiful cars. The popular cars were given the greatest prominence; the more expensive types seemed to be hidden away in dim corners of the hall with little attempt to attract attention to them or to show them off as the masterpieces of British engineering that they are.

From the Motor Show it is not a great step to the lighting of car showrooms and on the next few pages are shown a number of lighting installations in showrooms in different parts of the country.

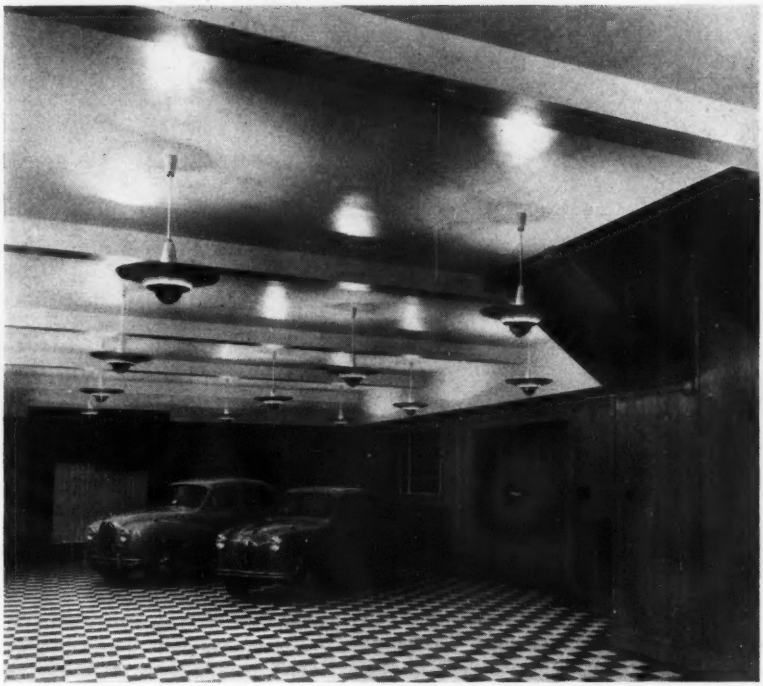
Cornelius Parish, Hull.

Another lighting installation in motor car showrooms to be completed recently is in the Anlaby Road showrooms of Cornelius Parish Ltd., the main Austin Distributors in Hull, Yorks.

The main sales floor, which is of irregular shape, is approximately 86 ft. long and 32 ft. wide and has a ceiling height of 14 ft. A total of seventeen Holophane semi-indirect Auralite pendants are employed, sixteen in two rows of eight, the light sources being mounted 11 ft. 3 in. above the floor. Each pendant carries one 300-watt tungsten lamp.

The installation provides an average illumination of 15 lm./ft.², and the well-diffused light distribution characteristics afforded by these low brightness sources has proved eminently suitable for the display and examination of the coach-work of motor vehicles.

Lighting designed by: T. Beadle and Co., Ltd., Hull.



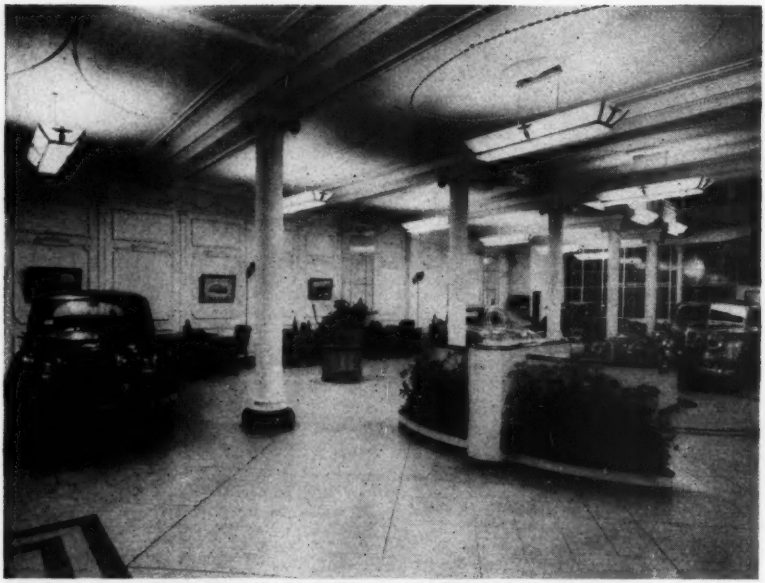
Nash and Co., Ltd., Harrogate.

This showroom is lighted by a number of Benjamin type "55" Anolier indirect lighting units.

A point of interest is that this "Anolier" installation gives reflections in the car body-work conforming with the modelling of the car, not with the inner workings of the lighting system.

The showroom panelling is light oak and this installation escapes from the highly contrasted and, therefore, glaring ceiling which is all too common with indirect lighting installations. The slightly glossy paint used on the ceiling gives life to the installation and prevents the hard definition between ceiling and walls which so often gives rise to the excessive contrast and glare mentioned above.

Lighting designed by: The General Electric Co., Ltd.



Austin Motor Export Corporation, London.

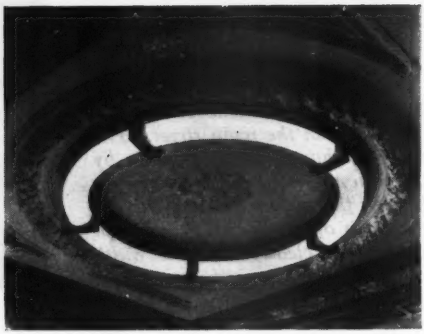
The lighting of the Austin showrooms in Oxford Street is by means of hot cathode fluorescent lamps in pendant and wall bracket fittings. Fifteen pendant fittings are arranged in three parallel lines, each fitting containing two daylight and two warm-white 5-ft. 80-watt lamps. The five bracket lamps at the rear of the showrooms contain only three lamps each. The metalwork of the fittings is gilt with reeded glass panels and polystyrene louvres. The design incorporates the Austin motif. The average illumination is 25 lm./ft.².

Lighting designed by: The General Electric Co., Ltd.

Vincents, Yeovil.

This showroom is one of the largest in Yeovil and occupies a corner site in the main street. The main lighting is provided by Crompton "Ashford" fluorescent lighting fittings mounted directly on the soffit of the ceiling beams, and spaced out clearly over the width of the area to conform to the general ceiling pattern. Two 80-watt tubes are totally enclosed within a one-piece diffuser of fluted opal plastic material and flashed opal ends. With natural tubes the result is a diffused light pleasant to the eye and giving true colour rendering of car finishes. Spotlights are mounted on window pillars and focused on chromium radiators, etc., of cars displayed, to provide emphasis lighting which gives added attraction to the "passer-by."

Lighting designed by: Crompton Parkinson, Ltd.
Contractors: R. and G. Bowsher, Yeovil.



Rolls-Royce, London.

The Rolls-Royce Ltd. showroom in Conduit-street has a cold cathode installation consisting of four large circular fittings 7 ft. 6 in. in diameter and six smaller circular fittings 6 ft. 4 in. in diameter all fixed at ceiling level; there are also nine large straight 8-ft. fittings fixed at the top of each window. Each fitting consists of a 20-gauge metal frame, semi-circular in section, with ribbon and reed moulding for decoration, and contains three 20-mm. medium white 120 m.a. tubes. All metalwork is finished anodised metallic bronze. The fittings are totally enclosed by a half-round white reeded "Perspex" moulding over the tubes acting as a diffuser. The total footage of tubing is 800 and the total light output is 156,000 lumens.

Lighting designed and fittings manufactured by: Major Equipment Co., Ltd.

Shaw and Kilburn, London

This showroom in Berkeley Square makes use of cold cathode lighting. The tubes are installed in continuous triple lines which are built into the ceiling so that the lighting feature blends with the general architecture. The high tension gear and wiring is concealed inside the ceiling but is easily accessible. The tubes are off-white in colour and a total of 600 ft. of tubing is installed.

Lighting designed by: Ionlite, Ltd.

Arnold G. Wilson, Leeds.

This new showroom, which can accommodate 10 *cars, is lighted by* 45 *"Mazda"* 150*-watt reflector spotlights in special fittings recessed flush to the ceiling. The lamps have been chosen for their sparkle, which gives a lively appearance to the interior and extremely effective directional illumination. Mounted at a height of* 12 *ft. in three rows of* 15 *fittings* 6 *ft. apart, they provide an average illumination of* 25 *lm./ft.*^{2}.

The offices and stores are lighted by batten fittings housing "warm white" fluorescent lamps.

Lighting designed by: The British Thomson-Houston Co., Ltd.
Contractors: George Lowe Ltd., Leeds.

Nuffield Exports, Ltd., London.

At the London showrooms of the Nuffield Organisation, Nuffield House, Piccadilly, a modified form of shop-window lighting is used in which "Atlas" reflector fittings, each with two 5-ft. 80-watt lamps and detachable louvre frames, are continuously mounted in three rows supported on short suspension rods. The total load is 4.6 kw., and, for good colour rendering, one "Warm White" and one "Northlight" lamp is used in each reflector. The total lumen output is 138,000—the equivalent of 50 200-watt tungsten filament lamps, but there is complete absence of glare.

Lighting designed by: Thorn Electrical Industries, Ltd.
Contractors: St. James Electrical Co., Ltd.

I.E.S. ACTIVITIES

London

At the sessional meeting held at the Welcome Research Institution in London on November 10, Dr. H. H. Ballin and Mr. W. J. Vine presented a paper entitled "Application of Fluorescent Dimming Circuits."

This paper was in effect a progress report on the uses of fluorescent dimming circuits since their introduction in 1950. New and simplified dimming circuits designed for application where the full range of adjustment is not necessary were demonstrated. These include 5- and 20-step miniature dimmers as well as colour-changing circuits to give flexible shop window and display lighting.

A survey of the equipment used shows that open-type fittings could be employed even in rain, owing to the cool running of fluorescent tubes. The advantages of remote control and various types of automatic boards were examined.

Attention was drawn to the cases in inindustry where a modification of background and surround brightness is desirable —such as for many inspection processes or in airfield control towers where the interior lighting has to be reduced with fading daylight. The authors said that miniature dimmers with fluorescent tubes have applications in such cases and are also likely to find application in hospital wards.

The authors gave their experience with fluorescent stage lighting for cyclorama and general lighting as well as for a variety of effects. Its usefulness for spectacular production has been increased by the introduction of ultra-violet fluorescent tubes for "black light" effects. The application of fluorescent dimming for auditorium lighting was also discussed. Colour changing can also be used to bring out the appropriate atmosphere where a hall is used for lectures, social gatherings or dances.

The potentialities as well as the limitations of employing fluorescent dimming for floodlighting buildings or for the illumination of gardens and parks were discussed. It was pointed out that the recent Coronation festivities had given a welcome stimulus to local authorities to enhance the amenity value of their public buildings and parks in this way.

Colour-changing floodlighting was considered by the authors as being particularly suitable for theatres, cinemas and hotels, and also likely to find application on public buildings where for reasons of size or position ordinary floodlighting would be ineffectual. In the choice of colours care had to be taken to avoid a predominance of any colour, such as green. The desirable speed of colour changing and the colour pattern over the façade of the building were also reviewed.

The paper also dealt with the application of fluorescent dimming circuits to lighting for display and for exhibition work. The authors concluded with the opinion that by its efficiency, low cost and flexibility, fluorescent dimming could make a great contribution to better and more artistic lighting.

Sussex Group

A very successful meeting of the Sussex Group was held at Eastbourne on November 3, when Mr. A. E. Canham of the Electrical Research Association gave a talk on the effect of artificial light on plant growth. Invitations to the meeting were issued to the local gardening, horticultural and allotment societies, to members of the staff of the South Eastern Electricity Board and to other people in the area to whom it was thought such a talk would be of interest. The attendance was 78, people coming from Tunbridge Wells, Hastings, Brighton and throughout the area of East Sussex. Mr. M. W. Hine was in the chair.

Mr. Canham's talk was very well received and was well illustrated by a number of good slides. Mr. Claydon, who is a specialist in agriculture with the East Sussex and South West Kent Sub-Area of SEEBoard, and who has been responsible for many interesting practical installations of plant irradiation, opened the discussion. After other members had spoken and Mr. Canham had replied, a vote of thanks to the speaker was passed. The chairman in closing the meeting said the Society was greatly indebted to the Eastbourne Corporation for the use of the

Council Chamber and other accommodation for the meeting.

Gloucester and Cheltenham Centre

The Gloucester and Cheltenham Centre opened the new session with their annual dinner, which took place at the Belle Vue Hotel, Cheltenham, on October 15. The guests included the President, Mr. W. R. Stevens, and the Secretary, Mr. G. F. Cole, and Mr. R. W. Steel and Mr. H. A. Turner, chairman and secretary respectively of the Bath and Bristol Centre. Over 70 members and guests were present and spent a most enjoyable evening.

Expressing a welcome to the guests, the chairman, Mr. M. C. Hughes, said that the President and Secretary had many calls upon their time, and the Centre was very pleased that they were able to attend the dinner, coming as it did in the first week of the Society's new session. Referring to the visitors from the Bath and Bristol Centre, he said that the Centre owed much to them, as they had done much to give a new lease of life to the Centre when it had fallen upon difficult times a few years ago; he said that it was evident from the attendance at the dinner that the Gloucester and Cheltenham Centre was once again very much alive.

Referring to the activities of the Society, Mr. Hughes said that the I.E.S. had never been, and probably never would be, a big society. Nevertheless, it did a very useful job of work and it was necessary that this work should be given greater recognition. He felt that the Society could have a much greater impact on the public in general and on the electrical industry in particular; for example, the I.E.S. might do more to improve the standard of lighting fittings in the same way as it has improved standards of illumination. The Society should not be complacent—it may well be that the aims and objects of the Society should be reconsidered.

In reply to Mr. Hughes, Mr. Stevens congratulated the Centre on having overcome its recent difficulties, and also on starting the session with a social function. Lighting, he said, was essentially a personal subject and the more informal contact there was within the Society the better. He mentioned the Society's Summer Meeting as an occasion when members could mix freely and discuss matters of interest and said that he hoped that all Centres would fully support the next Summer Meeting at Southport.

Replying in detail to some of the comments made by the chairman on the activities of the Society he said that the Society was originally founded mainly by those who were interested in the research side of lighting and there had, therefore, always been a bias in that direction; however, he had pointed out in his presidential address that the time had come for the practising lighting engineer to play a much greater part. He said there was a need for members to put more into the Society so that the Society as a whole could do more work; the value of the support received from the industry should not be underestimated, but lack of funds did limit the work the Society could do. However, he said he would note the points raised by Mr. Hughes.

Other short speeches were made by Mr. Cole and Mr. Steel, after which members enjoyed some excellent entertainment until the late hours.

Glasgow Centre

The first sessional meeting of the Glasgow Centre for 1953-54 was held in the Institute of Engineers and Shipbuilders, Elmbank Street, Glasgow, at 6.30 p.m. on Thursday, October 1.

The chairman, Mr. W. Quinn, gave a short résumé to members present, of the activities of the Centre Committee on their behalf. He made reference to the various sub-committees and of their plans and work towards Society and membership development.

Mr. S. Anderson then gave his paper on "Blended Light." Of particular interest was the new fluorescent MBF lamps which Mr. Anderson demonstrated.

Manchester Centre

The first meeting of the Manchester Centre was held on Thursday, October 8, when a symposium on Sports Lighting was held. The proceedings consisted of a review of Sports Lighting Practice, by Mr. A. Wilcock, followed by discussion in which the principals were Mr. E. Tyldesley, the former Lancashire and England cricketer, and Mr. K. K. Mitchell, director of physical education to the Y.M.C.A.

Mr. Wilcock described, with the use of lantern slides, recommended artificial lighting practice for a wide variety of sports and commented upon the natural lighting of cricket fields. He stated that the comment "bad light stopped play" was a frequent one and wondered as to the lighting engineer's position in respect of a lighting opinion passed by the uninitiated. He referred to a comment made in the

Press last summer by a former international cricketer that umpires should be supplied with lightmeters and suggested that there was scope for an investigation into critical lighting conditons, which might bring in the questions of illumination, immediate background and surround brightnesses, the speed of the bowler, and possibly a host of other things.

Mr. Wilcock expressed the opinion that the increasing practice of removing sight screens was to be deplored, and also expressed his doubts on the use of coloured screens. He pointed out the value of a good eyeshade in preference to sunglasses for watching cricket, and suggested that the use by the Australian cricketers of a cap with a large peak was to be commended.

Mr. Tyldesley, in opening the discussion, received a very enthusiastic reception, and stated that he would confine his remarks to cricket. He stated that in his opinion the decison as to what constituted bad light was best left to the batsman, and said that in any investigation the lighting engineer should take account of how long the batsman had been at the wicket. Mr. Tyldesley commented that when a man is "set" the ball looks like a football and the light doesn't affect him anything like as much as it does the man who has just arrived at the wicket. Mr. Tyldesley agreed with Mr. Wilcock upon the value of sight screens, but said that he liked the light green ones being used at present at Old Trafford. He said that in his opinion Old Trafford was the best-lighted ground in the country and said that this was due to the absence of tall buildings behind the bowler's arm.

There followed a considerable general discussion on lighting in relation to cricket and various suggestions were made for the lighting of indoor practice nets. It was generally agreed that these could greatly assist in the training of the young cricketers.

Mr. K. K. Mitchell remarked chiefly upon the lighting for indoor sports, and particularly upon gymnasia lighting. He stated that the requirements were many and varied and that in additon to settling the artifical lighting requirements the lighting engineer should consider the natural lighting.

Mr. Mitchell expressed the view that frequently the artificial lighting was superior to the natural lighting since windows as at present positioned, in the side walls, were serious sources of glare.

In the general discussion that followed many members and visitors took part, and most contributions related to the lighting of football fields. A divergence of opinion regarding the merits of corner pylon siting and side siting was apparent, and the problems of shadowing, glare, maintenance, cost and others were considered in respect of each system.

It was concluded, however, that whatever the system employed, if the floodlighting was well done it had much to offer a sport that suffered from the serious disadvantage of having too little time in which to develop its talents and show them to sufficient people.

Nottingham Centre

Before a gathering of 64 members and friends of the Nottingham Centre Mr. Norman C. Slater was inducted as the Centre chairman for the 1953-54 Session at a dinner held at the Odeon Restaurant, Nottingham, on Thursday, September 24, 1953. Mr. W. J. P. Watson, a vice-president, and Mrs. Watson were among the guests of the Centre.

During the induction ceremony, Mr. P. L. Ross, the retiring chairman, presented Mr. Slater with a brass gavel, to be kept by him as a memento of his year of office. Mr. Slater then proposed the toast "Our Guests," which was responded to in a very amusing manner by Mr. P. M. Furse. The evening concluded with an hour or two's dancing.

Sheffield Centre

On Monday, October 12, before a large audience, at the Medical Library of the University of Sheffield, the Sheffield Centre's new chairman, Mr. J. Dean, was installed, and presented his chairman's address entitled "The Contractor's Approach to a Lighting Installation." Mr. Dean stressed the need for co-operation between the illuminating engineer and the contractor in the planning stage in order that consideration could be given to points in respect of the actual installation and in particular to the ease with which cleaning and maintenance could be carried out. He then went on to discuss various wiring methods in general use, and in particular that of V.R.I. cables protected by steel conduits. By way of example he discussed the case of a factory having a pitched roof supported on trusses, and he examined the details of the circuits, switching and fusing. He emphasised the need for adequate fuse protection when installations are supplied from modern distribution networks from which heavy fault currents are liable to flow. Finally, some of the difficulties of

installation work and how they are overcome were described.

As this was the chairman's address no discussion took place. Mr. Dick, the acting chairman during Mr. Dean's address, proposed a vote of thanks to Mr. Dean and this was unanimously supported by the members present.

Forthcoming I.E.S. Meetings

LONDON

December 8th

Sessional Meeting. "Lighting For Textile Production," by H. Hewitt. (At the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) 6 p.m.

CENTRES AND GROUPS

December 2nd

EDINBURGH.—"Dimming of Fluorescent Tubes and Stage Lighting," by H. H. Ballin. (At the Conference Room, Manor Club, 12, Rothesay Place, Edinburgh, 3.) 7 p.m.

NEWCASTLE.—"Lighting for Enjoyment," by T. O. Freeth. (At the Roadway House, 8, Oxford Street, Newcastle-upon-Tyne, 1.) 6.15 p.m.

SWANSEA.—"Sports Lighting." (At the Plaza Buildings, The Kingsway, Swansea.) 6.30 p.m

December 3rd

GLASGOW.—"Application of Dimming Fluorescent Tubes," by H. H. Ballin. (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m

GLOUCESTER AND CHELTENHAM.—"Interior Decoration and its Influence on Lighting," by A. G. Ellis. (At the General Electric Co. Ltd., 2, St. Aldgate Street, Gloucester.) 6.30 p.m.

NOTTINGHAM.—"Some Problems in Railway Lighting," by E. Morgan. (At the Demonstration Theatre of the East Midlands Electricity Board, Smithy Row, Nottingham.) 6 p.m.

December 4th

BIRMINGHAM.—"Illuminated Signs," by E. E. Faraday and E. F. Martin. (At "Regent House," St. Phillip's Place, Colmore Row, Birmingham.) 6 p.m.

CARDIFF.—Visit to Automatic Telephone Exchange.

December 8th

STOKE-ON-TRENT.—"Neon Lighting," by C. Higgins. (At the Lecture Hall of the Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent.) 6 p.m.

December 10th

MANCHESTER.—"The Lighting of Churches," by W. T. F. Souter. (At the Demonstration Theatre of the North Western Electricity Board, Town Hall Extension, Manchester.) 6 p.m.

BRADFORD.—"Cinema Lighting and Regulations." (At the Offices of the Yorkshire Electricity Board, Bradford No. 1 Sub-Area, 45-53, Sunbridge Road, Bradford.) 7.30 p.m.

December 11th

CARDIFF.—Visit to Automatic Telephone Exchange.

December 14th

LEEDS.—"Manufacturing Methods of Producing Lighting Fittings," by G. S. H. Mogford. (At the Lecture Theatre of the Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

December 15th

LIVERPOOL.—"Home Lighting," by Miss M. D. Wardlaw. (At the Merseyside and North Wales Electricity Board's Service Centre Lecture Theatre, Whitechapel, Liverpool.) 6 p.m.

December 16th

NORTH LANCASHIRE.—"Fluorescent Stage Lighting." by H. H. Ballin. Joint meeting with the Preston Branch of the Association of Supervising Electrical Engineers. (At the Demonstration Theatre of the North Western Electricity Board, 19, Friargate, Preston.) 7.30 p.m.

TEES-SIDE.—"Road Vehicle Lighting," by K. J. Jones. (At the Cleveland Scientific and Technical Institution. Corporation Road, Middlesbrough.) 6.30 p.m

December 21st

SHEFFIELD.—"Three Dimensional Cinema Films," by A. Bowen, J. Moir and A. P. Castellain. (At the Surrey Street Library Theatre.) 6.30 p.m.

The Central Criminal Court

The Central Criminal Court, known as the Old Bailey, has been restored after being damaged at least three times during World War II. In July, 1950, the Court of Common Council of the City of London approved a scheme of repair at a cost of nearly £500,000, upon which work began the following August. Three of the permanent Courts, including a new one (Court No. 5, which is illustrated on page 468), have been reopened, and the remaining work of restoration and improving the building will be finished in all probability by the end of the year.

The main lighting in the recently constructed No. 5 Court is provided by three specially made Ediswan ceiling fittings. These fittings are each 42 in. in diameter and 15 in. deep; they are made of metal, bronze cellulosed and glazed with diffusing glass. Each fitting weighs approximately 120 lb. Nine lamps are used per fitting to provide a high level of diffused light in the well of the Court. The units are fitted with precision type raising and lowering gear to ensure exact positioning in the cast brass ring fixed on the plaster moulding which surrounds the opening in the acoustic ceiling into which the fitting is raised.

REVIEWS OF BOOKS

"Illumination Engineering," by Warren B. Boast, Ph.D., McGraw-Hill Book Co. Inc., pp. xi + 340, figs. 160, price $7.00.

This book is intended for advanced engineering students. The approach to the subject is unusual, and the treatment is very mathematical. Whilst this approach is very relevant to the work of the advanced photometric laboratory, especially with the modern adoption of a physical basis for photometry, it will probably be beyond the capabilities or requirements of the average lighting student.

The first two chapters deal with the basic ideas of radiation and light; the next six chapters are concerned with the mathematics of photometric calculations. The (single) chapter on lamps gives some details of American lamps and circuits and includes calculations on lamp performance and economics. Five chapters are devoted to various aspects of interior installation design, such as the lumen method, inter-reflection method, and architectural elements; one chapter deals with colour specification, and one each with floodlighting, street-lighting, sources of near-visible radiation, and finally electrical wiring.

Throughout, the main consideration is the calculation procedure involved; many tables of current American data are included, but the techniques are described only in so far as they affect the formulation of the calculation problem. The mathematical formulae developed are numerous and elaborate; in many cases they rest on simplifying assumptions (e.g., uniform diffusion) which render the value of the precise mathematical analysis doubtful for practical conditions.

The book is a very thorough and sound treatment of the mathematical side of those parts of lighting technology with which it deals, and it is well produced. There are a number of details of which one might disapprove, e.g., no reference to the *candela*, or the unusual definition and use of the term *luminosity*. However, an understanding of the principles of the methods described should be most valuable to the advanced student, provided the practical value of such calculation methods is viewed in its right perspective. One word of warning—the book is not a textbook on Illuminating Engineering as this term is generally understood.

S. S. B.

"Neuzeitliche Leuchten." By Alexander Koch. Pp. 104, *Figs.* 260. *Verlagsanstalt Alexander Koch. G.m.b.H., Stuttgart. Price DM* 29.50.

This book is similar in many respects to another book published in Germany and reviewed in this journal a few months ago. It consists of illustrations of contemporary interior lighting fittings and shows examples from a number of European countries and the United States; the bulk of those shown are of German origin. It is divided into six sections, table lamps, desk lamps, floor standards, wall brackets, ceiling lamps, and the final section in which are shown a number of interior installations as examples of "light within space." The captions are given in German, English and French.

Whatever we may think of some of the fittings shown, and one has to remember that many of them are not what we might call production models but are perhaps made as special fittings for a particular application, they indicate once again that designers in other countries are rather more willing or perhaps are given greater encouragement to experiment than are those in this country.

Most of the fittings illustrated are for incandescent lamps. The book is well produced and worth study by those interested in fittings design.

G. C.

"Electricity in the Garden." Pp. 121, *with* 23 *illustrations and* 27 *line drawings and Index. By Geoffrey Gerard, W. H. and L. Collingridge, Ltd., London. Price* 15*s.*

As stated in the Foreword, the purpose of this book is to show the gardener how electricity can be useful to him. It deals with a number of applications, including soil warming, greenhouse heating, soil sterilisation, etc., so that the chapter on lighting is only a small part of the book. Those who have read recent articles on the subject of artificial lighting and plant growths are unlikely to learn anything from this brief note on the subject. The horticultural applications of lighting are, however, in their infancy, and the book will no doubt serve to introduce the subject to many gardeners. Those who already know how to light their gardens and greenhouses will doubtless be interested in the remainder of the book.

G. C.

POSTSCRIPT

By "Lumeritas"

Few, if any, innovations meet with universal approval, and certainly such approbation has not been accorded to the flashing amber beacons which are now in operation at many pedestrian road crossings. It was to be expected that *some* vehicle drivers would complain at first of "distraction" and "confusion," but the "scream" against the beacons put out by some of the daily papers has been both premature and unwarrantably violent. Under the heading, "Blinking Beacons a Peril Motorists Complain," one paper stated that "many drivers approaching the zebras stop suddenly, taking the lights for amber traffic lights and following cars run into them. There have been several accidents like this." But surely these accidents might equally well have occurred if the leading driver had stopped suddenly because there was a pedestrian actually on the crossing; such accidents should not occur anyway if drivers are as alert as they should be, but I have witnessed such an accident in broad daylight and before beacons were installed! The article in question goes on to quote a motorist of 30 years' experience as saying he has "often had to brake abruptly in complete confusion. It needed a second look, which is obviously dangerous, to realise that I had come to a crossing, not to a traffic light." What would have happened if there had been no beacon to provoke that second look? Would he have seen the crossing at all? Apart from this, it seems to me (as a motorist of more than 30 years' experience) that anyone who, after one or two night drives, cannot distinguish a flashing beacon from an amber traffic light without a second look should not drive at night at all.

Of course there are road junctions where, owing to a necessary multiplicity of crossings, beacons are visible in various directions. But the motorist who is looking where he is going should have no real difficulty in ignoring beacons which are off his course. This view is not shared by a London evening paper, which recently published an editorial luridly entitled "Danger Lights," about the alleged undesirable effects of the beacons visible in Sloane Square. This square is entered by eight streets, each having a beacon-marked crossing. The result, we are told, is that the nervous tic of orange light from the beacons importunes everyone's attention, and turns the scene into "something resembling a giant pin-table where the ball has hit the jackpot and jittered all the lights into crazy, unstoppable activity." They "have succeeded only in distracting drivers' eyes. So bright and compelling are they that they defeat their own end. At the moment when the motorist should be looking for a pedestrian on a zebra, his eye wanders to a flashing beacon. So instead of helping to save lives the beacons can endanger them. Instead of a safety device they have turned out to be potential danger lights." This alarmist eloquence is followed by a reference to a possible political scapegoat, and an exhortation to "scrap the blinkers!" I visited the "giant pin-table" the night after reading of its "danger lights" to try their effect "on the dog." Expecting distraction and bewilderment, I experienced neither. Nor did I observe any vehicle behaviour which suggested that drivers' eyes were being diverted from the road to the lights. I traversed each crossing in turn, but if any oncoming motorist's gaze wandered to the beacons it wandered back to me in time to preserve me to say now, what a pity it is that any "responsible" newspaper should damn the flashing beacons at this early stage of their trial. As a motorist I have found them a boon; as a pedestrian I have more than once been nearly run down on crossings not yet provided with "their nervous tic of orange light."

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Light and Lighting

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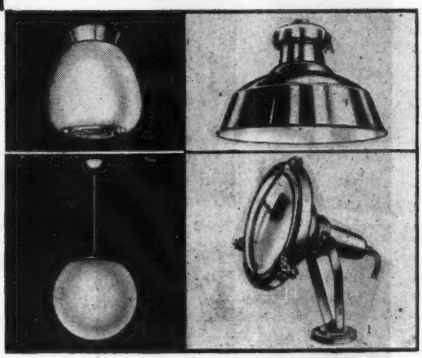

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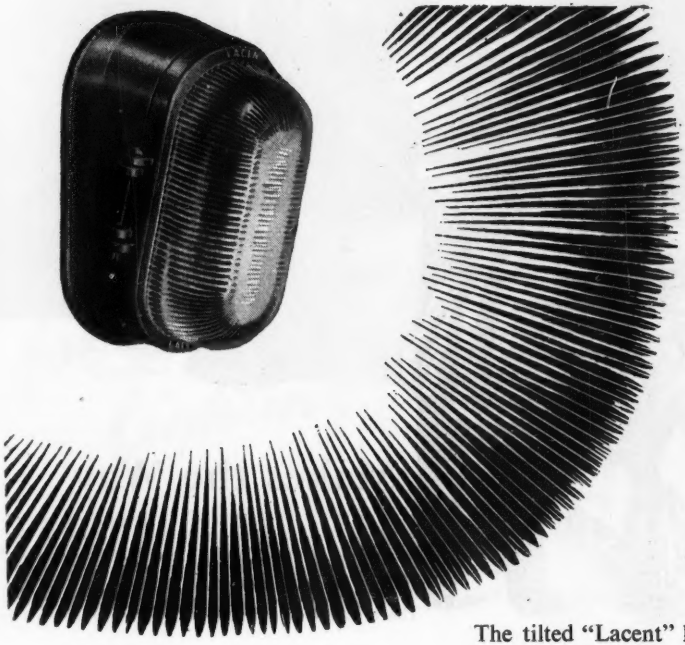

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